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BIOLOGY OF THE EGGS OF *EURYBRACHYS TOMENTOSA* (FABR.) (HOMOPTERA:FULGORIDAE)*

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ABSTRACT

The biology of the eggs of *Eurybrachys tomentosa* (F.) that feeds and breeds on *Calotropis gigantea* (L.) and *Cassia occidentalis* (L.) in the Palghat Gap has been described. The micromorphology of the eggs includes special features such as a spongy cone functioning as the respiratory cum micropylar apparatus at the cephalic end and a less pronounced spongy adhesive disc at the caudal end. Both these structures are new reports. The oviposition strategies, composition of egg clusters and hatching percentage in respect of the host plants have been assessed. The incidence of the egg parasitoids has been recorded.

Key Words : *Eurybrachys tomentosa, Proleurocerus fulgoridis.*

INTRODUCTION

Planthoppers have been studied more intensively for their destructive role as sap suckers of crops and less intensively as vectors of diseases of plants of economic value. While considering the polyphagous *Eurybrachys tomentosa* (Fabr.) as a potential vector of spike disease of sandal, Chatterjee (1933) reported briefly on several aspects of its biology. Swaminathan and Ananthakrishnan (1982 & 1984) made a survey of the population incidence of this bug along with a few other fulgoroid species and reported two egg parasitoids. Detailed study of any of its systems has not been attempted and that lacuna necessitated the present study.

MATERIAL AND METHODS

The adult males and females of *E. tomentosa*, collected from both *Calotropis gigantea* and *Cassia occidentalis*, were reared in separate plastic containers, covered with fine muslin. Cultures of the insects on these two food plants were maintained in the laboratory by *ad libitum* feeding on twigs of these plants. Egg batches were collected from the respective containers. From these egg batches, individual eggs were extirpated and preserved in lactic acid. Long term preservation in lactic acid made the egg shell transparent and pliable for dissection. From such materials, permanent mounts were made for micromorphological studies. Egg batches collected from these containers were further left for observation on their incubation period and hatching percentage.

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Egg batches were also collected from the fields from both host plants in this area and the emergence of nymphs as well as egg parasitioids from each batch has been recorded.

OBSERVATIONS

Oviposition Strategy

Eurybrachys tomentosa oviposits in batches (Plate I, 1 & 2) on its respective host plant, mostly on the undersurface of the leaves and occassionally on stems and barks. Oviposition site selection is not strictly specific, but the egg batches collected from the field were mostly from the undersurface of the leaves. Special effort to cover the eggs with white flocculent materials by the rotatory movements of the ovipositor, after ovipositing each row of eggs, suggests that the females mainfest certain degree of parental care. On completion of oviposition, each batch of eggmass is coverved by a heap of white flocculent material and there is no indication that such an egg mass is visited by the insect thereafter.

For the egg masses collected from the field as well as from the rearing cages under laboratory conditions, (temperature ranging from 21-28°C and relative humidity 60-74%) the incubation period has been found to vary from 14-21 days and the percentage of hatching from 80-100.

Egg Morphology

The freshly laid eggs are greenish white, oval, slightly expanded in the middle, pointed anteriorly and rounded posteriorly. Each egg is 1.36 $\pm$ 0.014 mm long and 0.86 $\pm$ 0.012 mm broad in the middle. The spongy cone at the cephalic end of the egg is 0.063 $\pm$ 0.006 mm in height and 0.07 $\pm$ 0.003 mm across.

Micromorphology

The chorion is smooth, without any sculpturations and is lightly pigmented. The cephalic end is marked by the spongy cone named here as the *cephalic cone* (Plate I, 4, CSC) and the caudal end is marked by a *spongy adhesive pad* (SAP). Both these structures (Fig.1) appear as appendages of the chorion at both ends, each being separated from the body of the egg by a short stalk. This stalk of the cephalic cone is much more prominent than at the caudal pad.

A closer examination of the cephalic cone under higher magnification reveals that it is a top shaped structure, having minute pores all around the apical region, leading to the spongy mesh. This spongy mesh communicates with the egg through, the stalk. Minute canals from the spongy mesh work coverage to the base that communicates with

the egg through the stalk. This structure represents the respiratory cum micropylar apparatus of the egg. It is not detachable from the chorion and the stalk appears to be a tubular extension of the chorion, the lumen of the tube communicating with the egg.

The structure of the caudal adhesive pad also appears like a tree with minute arborescent branches. But they are not canals. It is suggested that it may serve as an adhesive pad, anchoring the egg to the substratum, working on vacuumatic principle. This mechanism has distinct advantage during the time of hatching. Since the egg is non-operculate, hatching occurs by mechanical splitting of the chorion by the two pairs of spicules present at the cephalic end of the pronymph (Plate I, 7, EB) that serve as egg burster. A suitable anchoring device at the caudal end of the egg will therefore resist internal pressure that will facilitate splitting of chorion at the cephalic end of the egg and eclosion is thus made easy.

Biology of the egg parasitoid

The eggs of *E. tomentosa* have been found to be parasitised by the encyrtid, *Proleurocerus fulgoridis* (F.) (Plate I, 8 & 9).

Observations on the seasonal occurrence of the egg parasitoid suggest that *P.fulgoridis* occurs during June, July, October and November, reaching the peak of its population during the month of October and minimum during June and July. Table - 1 indicates the number of parasitoids emerged from each egg batch, collected during October, November and December. The percentage of parasitisation of the eggs collected from *C. occidentalis* and *C. gigantea* have been recorded at 29 to 57 and 40 to 83 respectively when the reigning temperature was 27-31°C and relative humidity 57-64%.

DISCUSSION

While considering *E. tomentosa* as a carrier of the serious spike disease of sandal tree, Chatterjee (1933) tried to highlight the biology of this bug through his experimental work in the Forest Research Station, Dehra Dun. Chatterjee also reported that each batch contained 30 to 42 eggs and each female laid up to 180 eggs. In the present observation, the fecundity rate appears to vary considerably between 26 to 240 eggs per batch and the highest fecundity rate has been observed in insects that feed and breed on *C. occidentalis* (Table 1). Since the males are very rarely found in the field it is persumed that polygamy is a rule and multiple mating may not occur in the field.

Oviposition strategy in Fulgoroidea is better known among Delphacidae in which the eggs in batches of 8 to 24 have been reported to be glued with spumaline inside the slits made by the ovipositor on the stems of the host plant (Williams, 1957 and Hinton, 1983). According to Sen (1948), in *Pyrilla perpusilla*, the eggs have been found to be laid in masses ranging from 7-55 and also have been seen on drooping lower portion of

the leaf blades and inside the partially open leaf-sheaths. In *E. tomentosa* the egg mass is always found deposited superficially, but covered by the white flocculent material.

Regarding the micromorphology of the eggs of fulgorids, practically nothing is on record and the only description given by Chatterjee (1933) is that the smooth chorion is covered with a white bloom and the colouration of the eggs was reported to change from greenish white to greenish brown and to brownish-black. The colouration of the normal eggs have been found to change from greenish white to light brown during development. But a parasitised egg could be recognized by its black colouration.

According to Hinton (1983) fulgorid eggs lack respiratory system and aeropyles are also absent. In delphacid, he described a single micropyle which is displaced towards the dorsal side, away from the cephalic end. The reporting here of the cephalic cone and the caudal pad in *E. tomentosa* therefore is considered to have immense physiological significance.

Egg parasitoids, as natural enemies of Fulgoroidea, have been enumerated by a few workers. They include two species of *Anagrus* (Mymaridae); one species of *Oligosita* (Trichogrammatidae), as reported by Samal and Misra (1978) and Bentur *et al.* (1982) and one species each of *Proleurocerus* (Encyrtidae) and *Tetrastichus* (Eulophidae), as reported by Swaminathan and Ananthakrishnan (1982). In the present study though *Proleurocerus fulgoridis* is found to be an egg parasitoid, the *Tetrastichus* species has been found to be an exclusive super parasitoid of the larvae of the lepidopteran ectoparasite *Epiricania* (*Epipyrops*) sp. that are found parasitising the females of *E. tomentosa*. *Tetrastichus pyrillae*, however, has been reported as a winter egg parasitoid of *Pyrilla perpusilla* by Sen (1948).

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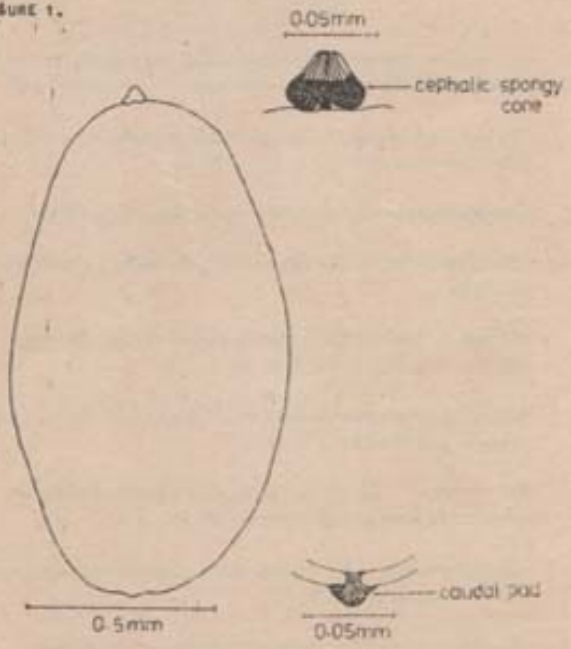
Table 1. *Eurybrachys tomentosa* (Fabr.) percentage parasitisation of the egg masses by *Proleurocerus flagorids* (F.) under field conditions

Number	Date of egg mass collection	Number of eggs per batch	Number of parasites emerged	Number of nymphs emerged	Percent parasitisation
* 1	9.10.89	29	24	5	83
* 2	18.10.89	206	60	146	29
* 3	19.10.89	43	17	26	40
* 4	24.11.89	106	8	98	8
* 5	6.12.89	78	22	56	28
* 6	16.12.89	184	106	80	57
		106 ± 27.42	39.5 ± 13.63	68.5 ± 16.60	40.6 ± 9.75

* Egg masses collected from the host plant, *Cassia occidentalis*

* Egg mass collected from the host plant, *Calotropis gigantea*

FIGURE 1.



Eurybrachys tomentosa – egg morphology

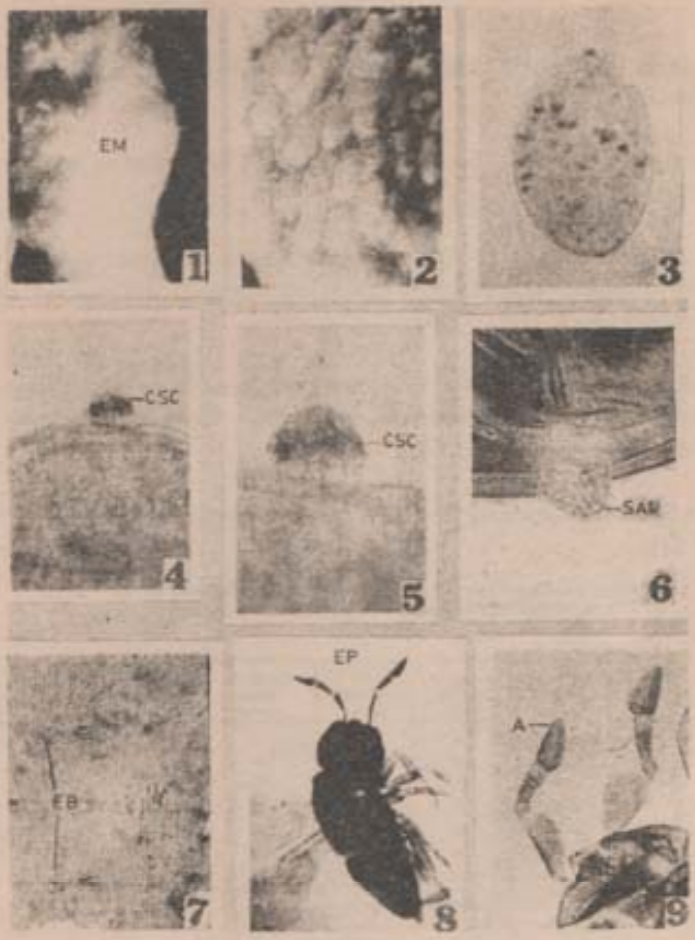


PLATE - I

Fig.1 : *Eurybrachys tomentosa* (Fabr.) - Egg mass (EM) being completely covered with the white flocculent wax material (20 x).

Fig.2 : The egg mass having the flocculent wax material removed, exposing the individual eggs arranged in rows (20 x).

Fig.3 : *Eurybrachys tomentosa* (Fabr.) Entire egg (10 X 10 x).

Fig.4 : The Cephalic end of the egg showing the spongy cephalic cone (CSC) (10 X 20 x).

Fig.5 : Magnified view of the cephalic end of the egg showing the spongy cephalic cone (CSC) (10 X 40 x).

Fig.6 : Magnified view of the caudal end of the egg showing the caudal spongy adhesive pad (SAP) (10 X 40 x).

Fig.7 : The cephalic end of the pronymph cuticle showing two pairs of spicules serving as egg bursters (EB) (10 X 20 x).

Fig.8 : An egg parasitoid (EB), *Proleurocerus fulgoridis* emerged from the egg of *E. tomentosa* (10 X 10 x).

Fig.9 : Magnified view of the antenna (A) of the egg parasitoid (EP) (10 X 20x).